# Indira Gandhi University Meerpur Rewari

**(A State University established under Haryana Act No.29 of 2013)**

## Examination Scheme &Syllabus for B.TECH (Data Science) Semester 3rd&4th

**(w.e.f. 2024-25)**

## VISION AND MISSION OF THE DEPARTMENT

### VISION

To train students to be highly effective instructors, researchers, developers and contributors to IT companies globally. Be regarded as a prestigious centre of scholarly achievement worldwide.

### MISSION

1. To foster advance research and best education in IT domain.
2. To create skilled employees for businesses and industries based on latest IT technologies like artificial intelligence, data science and IoT etc.
3. To offer learning environment that is centered on the needs of the students in order to help in their overalldevelopment.

**Programme Outcomes (PO),B.Tech, Department of CSE, Indira Gandhi University, Meerpur, Rewari**

| | | |
|---|---|---|
| PO1 | Knowledge | Capable of demonstrating comprehensive disciplinary knowledge gained during course of study. |
| PO2 | Research Aptitude | Capability to ask relevant/ appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis. |
| PO3 | Communication | Ability to communicate effectively on general and scientific topics with the scientific community and with society at large. |
| PO4 | Problem Solving | Capability of applying knowledge to solve scientific and other problems. |
| PO5 | Individual and Team Work | Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, multidisciplinary settings. |
| PO6 | Investigation of Problems | Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions. |
| PO7 | Modern Tool usage | Ability to use and learn techniques, skills and modern tools for scientific practices. |
| PO8 | Science and Society | Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices. |
| PO9 | Life-Long Learning | Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life. |
| PO10 | Ethics | Capability to identify and apply ethical issues related to one's work; avoid unethical behaviour such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work. |
| PO11 | Project Management | Ability to demonstrate knowledge and understanding of the latest IT technologies and apply these to manage projects. |

**Programme Educational Objectives (PEOs):**

The Department of CSE has formulated the Programme Educational Objectives (PEO's) with those in fields. The Programme educational objectives (PEO) are the statement that describes the career and professional achievement after receiving the degree. The PEO's of the Bachelor degree in Computer Science& Engineering are as follows:

**PEO1:** To have fundamental as well as advanced knowledge of the Information Technologies.

**PEO2:** To provide the professional services to IT industries, Research organization, in the domain of super specialization.

**PEO3:** To opt for higher education, disciplinary & multi-disciplinary research and to be a life-long learner.

**Programme Specific Outcomes (PSO's):**

The Programme outcomes (PSO) are the statement of competencies/ abilities. PSOs are the statement that describes the knowledge and the abilities the post-graduate will have by the end of Programme studies.

**PSO1:** The detailed functional knowledge of theoretical concepts and experimental aspects of computer science.

**PSO2:** To integrate the gained knowledge with various contemporary and evolving areas in computer sciences like Artificial Intelligence, Machine Learning, Data Science etc.

**PSO3:** To understand, analyze, plan and implement qualitative as well as quantitative problems in computer science.

**PSO4:** Provide opportunities to excel in academics, research or Industry.

**Mapping of PEO's with PO's and PSO's**

| S. No. | *Programme Educational Objectives* | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | To have fundamental as well as advanced knowledge of IT. | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| 2 | To provide the professional services to industries, Research organization, in the domain of super specialization. | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| 3 | To opt for higher education, disciplinary & multi-disciplinary research and to be a life-long learner. | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

# COURSECODEAND DEFINITIONS

| CourseCode | Definition |
|---|---|
| L | Lecture |
| T | Tutorial |
| P | Practical |
| BSC | BasicScience Courses |
| ESC | Engineering Science Courses |
| HSMC | HumanitiesandSocialSciencesincluding Management courses |
| PCC | ProfessionalCoreCourses |
| LC | LaboratoryCourses |
| MC | MandatoryCourses |
| PT | PracticalTraining |
| S | Seminar |

# B.Tech(DataScience)SchemeofStudies/Examinationw.e.f.2024-25

## Semester-3

| Sr. No. | CourseCode | CourseTitle | Hoursperweek | | | TotalHrs.perweek | Credit | Examination Schedule(Marks) | | | | Duration of Exam(Hours) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | | Mark ofClasswork | Theory | Practical | Total | |
| 1 | PCC-CSE-201 | DatabaseManagementSystems (commonwithB.Tech.(CSE)in semester3) | 3 | 0 | 0 | 3 | 3 | 25 | 75 | | 100 | 3 |
| 2 | PCC-CSE-203 | Data Structures &Algorithms (commonwithB.Tech.(CSE)in semester3) | 3 | 0 | 0 | 3 | 3 | 25 | 75 | | 100 | 3 |
| 3 | PCC-DS-301 | Introduction to Data Science/Basics of Data Science | 3 | 0 | 0 | 3 | 3 | 25 | 75 | | 100 | 3 |
| 4 | PCC-CSE-207 | PythonProgramming (commonwithB.Tech.(CSE)in semester3) | 2 | 0 | 0 | 2 | 2 | 25 | 75 | | 100 | 3 |
| 5 | BSC-MATH-253 | Applied Computational Statistics | 3 | 0 | 0 | 3 | 3 | 25 | 75 | | 100 | 3 |
| 6 | HSMC-01 | Economics forEngineers (commonwithB.Tech.(CSE)in semester3) | 2 | 0 | 0 | 2 | 2 | 25 | 75 | | 100 | 3 |
| 7 | LC-CSE-209 | DatabaseManagementSystemsLAB (commonwithB.Tech.(CSE)in semester3) | 0 | 0 | 4 | 4 | 2 | 25 | | 25 | 50 | 3 |
| 8 | LC-CSE-255 | Computational Statistics Lab | 0 | 0 | 4 | 4 | 2 | 25 | | 25 | 50 | 3 |
| 9 | LC-CSE-213 | Data Structures &Algorithms LABUsingC (commonwithB.Tech.(CSE)in semester3) | 0 | 0 | 4 | 4 | 2 | 25 | | 25 | 50 | 3 |
| 10 | LC-CSE-215 | PythonProgrammingLAB (commonwithB.Tech.(CSE)in semester3) | 0 | 0 | 2 | 2 | 1 | 25 | | 25 | 50 | 3 |
| **Total** | | | | | | | 23 | | | | 800 | |

# B.Tech.(Data Science)SchemeofStudies/Examinationw.e.f.2024-25

## Semester-4

| Sr. No. | CourseCode | CourseTitle | Hoursperweek | | | TotalHrs.perweek | Credit | Examination Schedule(Marks) | | | | Duration of Exam(Hours) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | | | Mark ofClasswork | Theory | Practical | Total | |
| 1 | PCC-CSE-202 | DiscreteMathematics commonwithB.Tech.(CSE) in semester 4) | 3 | 1 | 0 | 3 | 4 | 25 | 75 | | 100 | 3 |
| 2 | PCC-CSE-204 | ComputerOrganization&Architecture commonwithB.Tech.(CSE) in semester 4) | 3 | 0 | 0 | 3 | 3 | 25 | 75 | | 100 | 3 |
| 3 | PCC-CSE-206 | OperatingSystem commonwithB.Tech.(CSE) in semester 4) | 3 | 0 | 0 | 3 | 3 | 25 | 75 | | 100 | 3 |
| 4 | PCC-CSE-208 | ObjectOriented Programming commonwithB.Tech.(CSE) in semester 4) | 3 | 0 | 0 | 3 | 3 | 25 | 75 | | 100 | 3 |
| 5 | HSMC-02 | Organizational Behaviour commonwithB.Tech.(CSE) in semester 4) | 2 | 0 | 0 | 2 | 2 | 25 | 75 | | 100 | 3 |
| 6 | *MC-106 | EnvironmentalSciences commonwithB.Tech.(CSE) in semester 4) | 3 | 0 | 1 | 3 | 0 | 25 | 75 | - | - | 3 |
| 7 | PCC-CSE-254 | Fundamentals of DS, AI & ML | 3 | 0 | 0 | 3 | 3 | 25 | 75 | | 100 | 3 |
| 8 | LC-CSE-212 | OperatingSystemLAB commonwithB.Tech.(CSE) in semester 4) | 0 | 0 | 4 | 4 | 2 | 25 | | 25 | 50 | 3 |
| 9 | LC-CSE-214 | ObjectOrientedProgramming LABUsingC++ commonwithB.Tech.(CSE) in semester 4) | 0 | 0 | 4 | 4 | 2 | 25 | | 25 | 50 | 3 |
| 10. | LC-CSE-258 | Programming for Data Science & AI Lab | 0 | 0 | 2 | 2 | 1 | 25 | | 25 | 50 | 3 |
| 11 | HS-150 | Design Thinking Lab | - | - | - | - | 1 | - | - | - | 25 | - |
| **Total** | | | | | | | 24 | | | | 775 | |

*__MC-106__isa mandatorynon–credit courseinwhich thestudentswill berequiredpassing marksintheory.**NOTE**: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from theorganization&itsevaluationshall be carried outinthe 5thSemester.

# DatabaseManagementSystem

| | | | | | |
|---|---|---|---|---|---|
| Course code | PCC-CSE-201 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Course title | DatabaseManagementSystem | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 3 | 0 | | 3 | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Objectivesofthecourse**

a. To understand the different issues involved in the design and implementation of a databasesystem.
b. Tostudythephysicalandlogicaldatabasedesigns,databasemodeling,relational,hierarchical,andnetworkmodels
c. Tounderstandandusedatamanipulationlanguagetoquery,update,andmanageadatabase
d. TodevelopanunderstandingofessentialDBMSconceptssuchas:databasesecurity,integrity,concurrency,distributeddatabase,andintelligentdatabase,Client/Server(Database Server), DataWarehousing.
e. Todesignandbuildasimpledatabasesystemanddemonstratecompetencewiththefundamentaltasksinvolved with modeling,designing,and implementingaDBMS.

**Note**: Examiner will set nine questions in total. Question one will be compulsory. Question onewill have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks eachto be set by taking two questions from each unit. The students have to attempt five questions intotal,firstbeingcompulsoryandselectingonefromeachunit.

**Unit: 1**

**Databasesystemarchitecture:**DataAbstraction,DataIndependence,DataDefinition Language (DDL), Data Manipulation Language (DML).**Data models:** Entity-relationship model, network model, relational and object oriented datamodels,integrity constraints,data manipulationoperations.

**Unit: 2**

**Relationalquerylanguages:** Relational algebra, Tupleand domain relational calculus,SQL3,DDLandDMLconstructs,Opensourceand CommercialDBMS-MYSQL,ORACLE,DB2, SQLserver.

**Relational database design:** Domain and data dependency, Armstrong's axioms, Normal forms,Dependencypreservation, Losslessdesign.

**Query processing and optimization:** Evaluation of relational algebra expressions,Query equivalence,Joinstrategies,Queryoptimization algorithms.

**Unit: 3**

**Storagestrategies**:Indices,B-trees,hashing,

**Transactionprocessing:**Concurrencycontrol,ACIDproperty,Serializabilityof scheduling,Lockingand timestamp basedschedulers, Multi-versionand optimistic ConcurrencyControlschemes, Databaserecovery.

**Unit: 4**

**DatabaseSecurity:**Authentication,Authorizationandaccesscontrol,DAC,MACand RBACmodels, Intrusiondetection, SQLinjection.

**Advancedtopics:**Objectorientedandobjectrelationaldatabases,Logicaldatabases,Web databases, Distributeddatabases,Datawarehousing anddatamining.

## CourseOutcomes:

CO1 Tointroducetheconcept of Data Abstraction & Data Independence.
CO2 Todescribethefactors various Data base Models.
CO3 Toapplytheconcept of Relational query Languages.
CO4 To impart knowledge of Query Processing optimization with the help of Algorithms.
CO5 Toknowaboutthestorage strategies including Hashing.
CO6 Toinstructaboutthe Transaction Processing.
CO7 To explain the mechanism of Database Security & Authentication.
CO8 Gained knowledge about Object oriented and object relational databases

Mapping of Paper No. PCC-CSE-201

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | S | S | S | S | S | S | S | M | S | S | S | S | S |
| CO2 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | M | S | S | S | M | S | S | S | S | S | S | S | S | S | S |
| CO4 | S | S | S | S | M | S | S | S | S | S | S | S | S | S | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO7 | S | S | S | M | S | S | M | S | S | S | S | S | S | S | S |
| CO8 | S | S | S | M | S | S | M | S | S | S | S | S | S | S | S |

S=Strong M=Medium W=Weak

**Suggestedbooks:**

1. “Database System Concepts”, 6th Edition by Abraham Silberschatz, Henry F. Korth, S.Sudarshan,McGraw-Hill.
2. IntroductiontoDatabaseManagementSystem,SatinderBalGupta,AdityaMittal, UniversitySciencePress,New Delhi.

**Suggestedreferencebooks**

1. “PrinciplesofDatabase andKnowledge–Base Systems”,Vol1byJ. D. Ullman,Computer SciencePress.
2. “FundamentalsofDatabaseSystems”,5thEditionbyR.ElmasriandS.Navathe,PearsonEducation
3. “FoundationsofDatabases”,ReprintbySergeAbiteboul,RichardHull,VictorVianu,Addison-Wesley

# DataStructure&Algorithms

| | | | | | |
|---|---|---|---|---|---|
| Course code | PCC-CSE-203 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Course title | DataStructure&Algorithms | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 3 | 0 | | 3 | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Note**: Examiner will set nine questions in total. Question one will be compulsory. Question onewill have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks eachto be set by taking two questions from each unit. The students have to attempt five questions intotal,firstbeingcompulsoryandselectingonefromeachunit.

**Objectivesofthecourse:**

1. Toimpartthebasicconceptsofdatastructuresandalgorithms.
2. Tounderstandconceptsaboutsearchingandsortingtechniques
3. Tounderstandbasicconceptsaboutstacks,queues,liststreesandgraphs.
4. Toenablethemtowritealgorithmsforsolvingproblemswiththehelpoffundamental data structures

**Unit1:**

**Introduction:**BasicTerminologies: Concept of Data Structure, Choice of right Data Structure,Algorithms, howtodesignanddevelopalgorithm, Complexityofalgorithm.Operations:insertion, deletion, traversal etc.; Analysis of an Algorithm, **Searching:** Linear Search and BinarySearch Techniquesandtheircomplexityanalysis.

**Unit2:**

**StacksandQueues**:Stackanditsoperations:Algorithmsandtheircomplexityanalysis,Applicationsof Stacks: ExpressionConversionandevaluation-correspondingalgorithmsandcomplexity analysis. Queue, Types of Queue: SimpleQueue, Circular Queue, Priority Queue;OperationsoneachtypesofQueues:Algorithmsandtheiranalysis.

**Unit3**:

**Linked Lists:**Singlylinkedlists: Representation in memory, Algorithms of several operations:Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack andQueue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular LinkedLists:alloperationstheiralgorithms andthecomplexity analysis.

**Trees:**BasicTreeTerminologies,DifferenttypesofTrees:BinaryTree,ThreadedBinary Tree,BinarySearchTree,AVLTree;TreeoperationsoneachofthetreesandtheiralgorithmswithComplexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms andanalysis.

**Unit4:**

**Sorting and Hashing:** Objective and properties of different sorting algorithms:SelectionSort,BubbleSort,InsertionSort,SelectionSortQuickSort,MergeSort,HeapSort;PerformanceandComparisonam ongallthemethods.

**Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms andcomplexityanalysis.

# CourseOutcomes:

CO1 Tointroducetheconcept of Choice of right Data Structure,Algorithms.
CO2 Todescribethefactors Linear Search and BinarySearch Techniques.
CO3 Toapplytheconcept Algorithmsandtheircomplexityanalysis.
CO4 To impart knowledge of Priority Queue;OperationsoneachtypeofQueues.
CO5 Toknowabouttheoperationstheiralgorithms andthecomplexity analysis.
CO6 Toinstructaboutthe Applications of Binary Trees.
CO7 To explain the mechanism SelectionSort,BubbleSort.
CO8 Gained knowledge about traversal algorithms andcomplexityanalysis.

Mapping of Paper No – PCC-CSE-203

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | S | S | S | S | M | M | S | S | S | S | S | S | S | M |
| CO3 | M | S | S | M | S | S | S | M | S | M | S | S | S | S | S |
| CO4 | S | S | S | M | M | S | S | M | S | M | S | S | S | S | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | M | M | S | S | S | S | S | S | S | M |
| CO7 | S | M | S | S | S | S | S | S | S | S | M | S | S | S | S |
| CO8 | S | M | S | S | S | S | S | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

**Suggestedbooks:**

1. DataStructuresusingC&C++:byShukla,WileyIndia Ltd.
2. “FundamentalsofDataStructures”,IllustratedEditionbyEllisHorowitz,SartajSahni,and Computer SciencePress.
3. DataStructures,2edbyVenkatesan,WileyIndiaLtd.

**Suggestedreferencebooks:**

1. Algorithms,DataStructures,andProblemSolvingwithC++”,IllustratedEditionbyMarkAllenWeiss, Addison-WesleyPublishingCompany
2. DataStructures&AlgorithmsinJava,6edbyGoodrich,WileyIndiaLtd.
3. “HowtoSolveitbyComputer”,2ndImpressionbyR.G.Dromey,PearsonEducation.
4. C&DataStructuresbyDeshpande,WileyIndia Ltd.

## IntroductiontoDataScience/BasicsofDataScience

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | PCC-DS-301 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | IntroductiontoDataScience/BasicsofDataScience | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 3 | 0 | 0 | 3 | |
| InternalAssessment | 25Marks | | | | |
| Exam(SemesterExam) | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Objectivesofthecourse**

1. ToProvidetheknowledgeandexpertisetobecomeaproficientdatascientist;
2. Demonstrate an understanding of statistics and machine learning concepts that are vital for datascience;
3. ProducePythoncodetostatisticallyanalyseadataset;
4. Criticallyevaluatedatavisualizationsbasedontheirdesignanduseforcommunicatingstoriesfromdata5.

**Note**: The examiner will set nine questions in total. Question one will be compulsory. Question one will haveparts from all units and the remaining eight questions of 15 marks each to be set by taking two questions fromeach unit. The students have to attempt five questions in total, the first being compulsory and selecting onefromeachunit.

### UnitI

Introduction to Data Science, Different Sectors using Data science, Purpose and Components of Python in DataScience. Applications of Data Science, Data Science and Ethical Issues- Discussions on privacy, security, ethics- AlookbackatData Science-Next-generation datascientists.

### UnitII

Data Analytics Process, Knowledge Check, Exploratory Data Analysis (EDA), EDA-Quantitative technique, EDA-GraphicalTechnique,Data AnalyticsConclusionandPredictions.

## UnitIII

FeatureGenerationandFeatureSelection(ExtractingMeaningfromData)-Motivatingapplication:user(customer) retention- Feature Generation (brainstorming, role of domain expertise, and place for imagination)-Feature Selectionalgorithms.

## UnitIV

DataVisualization-Basicprinciples,ideasandtoolsfordatavisualization,Examplesofinspiring(industry)projects-Exercise:createyourownvisualization of a complexdataset.

## Outcomesofthecourse

1. Toexplainhowdataiscollected,managedandstoredfordatascience;
2. Tounderstandthekeyconceptsindatascience,includingtheirreal-worldapplicationsandthetoolkitusedbydata scientists;
3. ToimplementdatacollectionandmanagementscriptsusingMongoDB.

## TextBooks:


1. DataSciences&Analytics,V.K.Jain, KhannaPublishingHouse.
2. BusinessAnalytics:TheScienceof Data-DrivenDecisionMaking,UDineshKumar,John Wiley&Sons.
3. IntroducingDataScience:BigData,MachineLearning,andMore,UsingPythonTools,DavyCielen,JohnWiley & Sons.
4. JoelGrus,DataSciencefromScratch,ShroffPublisher/O'ReillyPublisherMedia


## ReferenceBooks:


5. AnnalynNg,KennethSoo,Numsense!DataSciencefortheLayman,ShroffPublisherPublisher
6. CathyO'NeilandRachelSchutt.DoingDataScience,StraightTalkfromTheFrontline.O'ReillyPublisher.
7. JureLeskovek,AnandRajaramanandJeffreyUllman.MiningofMassiveDatasets.v2.1,CambridgeUniversityPress.
8. JakeVanderPlas,PythonDataScienceHandbook,ShroffPublisher/O'ReillyPublisherMedia.
9. PhilippJanert,DataAnalysiswithOpenSourceTools,ShroffPublisher/O'ReillyPublisherMedia.

# PythonProgramming

| | | | | | |
|---|---|---|---|---|---|
| Course code | PCC-CSE-207 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Course title | PythonProgramming | | | | |
| SchemeandCredits | L | T | P | Credits | Semester 3 |
| | 2 | 0 | 0 | 2 | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Note**: Examiner will set nine questions in total. Question one will be compulsory. Question onewill have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks eachto be set by taking two questions from each unit. The students have to attempt five questions intotal,firstbeingcompulsoryandselectingonefromeachunit.

**Objectivesofthecourse:**

- ToimpartthebasicconceptsofPythonprogramming.
- TounderstandsyntaxofPythonlanguage
- TocreatedynamicapplicationsinPythonlanguage.
- ToimplementobjectorientedconceptsusingPythonlanguage

**Detailedcontents:**

**Unit1:**

**Introduction:**Fundamentalideasincomputerscience;moderncomputersystems,installingPython; basic syntax, interactive shell, editing, saving, and running a script; The concept of datatypes; variables, assignments; numerical types; arithmetic operators and expressions; commentsintheprogram;understandingerrormessages; Controlstatements:if-else, loops(for, while)

**Unit2:**

**Strings, text files**: String manipulations: subscript operator, indexing, slicing a string; strings andnumbersystem:convertingstringstonumbersandviceversa.Binary,octal,hexadecimalnumbers;text files: reading/writing text and numbers from/to a file; creating and reading aformattedfile(csvortab-separated).

**Unit3**:

**Lists, dictionary and Design with functions:**Basic list operators, replacing, inserting, removing anelement; searching and sorting lists; dictionary literals, adding, and removing keys, accessing andreplacing values; traversing dictionaries. Hiding redundancy, complexity; arguments and returnvalues;Programstructureanddesign.Recursivefunctions.

**Unit4:**

**Object Oriented concepts:** Classes and OOP: classes, objects, attributes and methods; definingclasses;designwithclasses,datamodelling;persistentstorageofobjects,Inheritance,polymorphism,operatoroverloading; abstract classes;exceptionhandling,tryblock.

# CourseOutcomes:

CO1 Tointroducetheconcept of moderncomputersystems,installingPython; basic syntax.
CO2 Todescribeunderstandingerrormessages; Controlstatements:if-else, loops(for, while).
CO3 Toapplytheconcept ofString manipulations: subscript operator, indexing.
CO4 To impart knowledge of text files: reading/writing text.
CO5 Toknowaboutthereplacing, inserting, removing anelement.
CO6 Toinstructaboutthe Programstructureanddesign.
CO7 To explain the mechanism of definingclasses;designwithclasses.
CO8 Gained knowledge about polymorphism,operatoroverloading; abstract classes.

Mapping of Paper No – PCC-CSE-207

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | M | S | S | S | S | S | S | S | M | S | M | S | S | M |
| CO3 | S | S | S | S | S | S | S | M | S | S | S | S | S | S | S |
| CO4 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO5 | M | M | S | S | S | S | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | S | S | S | S | M | S | S | S | S | M |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO7 | S | S | S | S | M | S | M | S | S | S | S | S | S | S | S |
| CO8 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

**Suggestedbooks:**

1.“FundamentalsofPython:FirstPrograms”KennethLambert,CourseTechnology,CengageLearning,2012

**Suggestedreferencebooks:**

1.“IntroductiontoComputerScienceUsingPython:AComputationalProblem-SolvingFocus”,ByCharlesDierbach,JohnWiley &Sons,December2012,

# AppliedComputationalStatistics

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | BSC-MATH-253 | | | | |
| Category | BasicScienceCourse | | | | |
| Coursetitle | AppliedComputational Statistics | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 3 | 0 | 0 | 3 | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Note**: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6parts of 2.5 marks each from all units and remaining eight questions of 15 marks eachto be set by takingtwo questions from eachunit. The students have to attempt five questions in total, first being compulsoryandselectingonefrom each unit.

## COURSEOBJECTIVES:

1. Understandthebasicsofdata,exploratorydataanalysis,statisticsandhypothesistestinginproblemsolving.
2. Illustratemultivariatedataanalysismethodstosolvethe problems.
3. Understandtheconceptsofclassificationmethodstoanalysisandrepresentationofmultivariatedatainreal world.
4. Understandandillustrate thestochasticprocesstosolverealworldproblems.

## Unit-I

Types of Data (Quantitative, Qualitative, Logical),Exploratory Data Analysis (Histogram, Scatter plots,Box plot, Fundamentals of Descriptive Statistics (moments- Measures of Central Tendency, Measure ofspread, Measure Shape), Overview of Probabilityand Combinatorics, Inferential Statistics (NormalDistribution, Statistic Sampling, Central Limit Theorem), Estimations (Point and Intervals- Confidenceintervals with means, sample proportions), Hypothesis Testing :Introduction, Confidence Intervals,

CriticalValuebased approach,P-valuebase approach, ZTests,TTests,the$\chi$2distribution,ANOVA/ANCOVA.

## Unit-II

MultivariateAnalysis:Multivariatedistributions:multivariatenormaldistributionanditsproperties,distributionsoflinearandquadraticforms,testsforpartialandmultiplecorrelationcoefficientsandregressioncoefficientsandtheirassociatedconfidenceregions.Dataanalyticillustrations.Wishartdistribution (definition, properties), construction of tests, union-intersection and likelihood ratio principles,inferenceon meanvector,Hotelling's T2.MANOVA-Inferenceoncovariancematrices.

## Unit-III

Classification methods: Discriminant analysis, principal component analysis and factor analysis, CanonicalCorrelation analysis, Correspondence Analysis, Multidimensional Scaling, Cluster analysis. Nonparametricandrobust methods ofmultivariate analysis. Graphicalrepresentationof multivariatedata.

## Unit-IV

Stochastic Process: Markov chains with stationary transition probabilities, properties of transition functions,classification of states, Stationary distribution of a Markov chain, existence and uniqueness, convergence tothe stationary distribution. Methods based on Markov chains for simulation of random vectors. MCMCalgorithm. Random Walks, queueing processes, branching processes. Gambler's ruin problem, transientstates.

## References:


1. W.Feller:*AnIntroductiontoProbabilityTheoryanditsApplications,*Vol.-II.
2. S.KarlinandH. M.Taylor,*A FirstCoursein StochasticProcesses*.
3. WilliamJ.Stewart, *Probability, MarkovChains, Queuesand Simulation*.
5. P.G. Hoel,S. C. Portand C.J.Stone, *Introductionto Stochastic Processes*.
6. S.Ross, *Introduction toProbabilityModels*.

7. T.W. Anderson,*An Introductionto MultivariateStatistical Analysis*.
8. Ross, IntroductiontoProbability.9thedition,Pearson,2006
9. G.JayKerns,Introduction toProbabilityandStatistics UsingR, 2016
10. AndyField, AnAdventureinStatistics, SAGEPublications, 2016
11. DawnGriffiths,HeadFirstStatistics,O'ReillymediaInc.,2019
12. TimothyCUrdan,StatisticsinPlain English,TaylorandFrancisPublisher, 2010
13. Brian.S.Everitt,TorstenHothorn,Handbookof StatisticalAnalysesUsingR,Chapman&Hall/CRC2006
14. C.R.Kothari,ResearchMethodology,NewAgePublishers,2004
15. MarleyW.Watkins,AstepbyStepGuidetoExploratoryFactorAnalysiswithRandRStudio,Tylor & Francis Group,2021
16. JoshephF.Hair,WilliamC.Blacket.al.,MultivariateData Analysis, 7th ed.
17. DenielJ.Denis,Univariate, BivariateandMultivariate StatisticsUsingR, JohnWiley&Sons,2020
18. A.Basilevsky,StatisticalFactorAnalysis&RelatedMethods–Theory&Applications,JohnWiley&Sons

# ECONOMICSFORENGINEERS

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | HSMC-01 | | | | |
| Category | Humanities/SocialSciences/Management | | | | |
| Coursetitle | EconomicsForEngineers | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 3 | 0 | 0 | 3 | |
| Branches(B.Tech.) | CommonForAllBranches | | | | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

CourseObjectives:

1. Acquaintthestudentstobasicconceptsofeconomicsandtheiroperationalsignificance.
2. Tostimulatethestudentstothinksystematicallyandobjectivelyaboutcontemporary economic problems.

**UNIT-1**

Definition of Economics- Various definitions, types of economics- Micro and Macro Economics,natureofeconomicproblem,ProductionPossibilityCurve,Economiclawsandtheirnature,Relationshipbetween Science, Engineering, Technologyand EconomicDevelopment.Demand- Meaning of Demand, Law of Demand,Elasticity of Demand- meaning, factors effectingit,its practical application and importance

**UNIT2**

Production- Meaning of Production and factors of production, Law of variable proportions, andReturns to scale, internal external economies and diseconomiesof scale. Various concepts of costof production- Fixed cost, Variable cost, Money cost, Real cost, Accounting cost, Marginal cost,Opportunitycost. Shape ofAveragecost,Marginal cost, Totalcost etc. inshort run andlong run.

**UNIT-3**

Market-MeaningofMarket,TypesofMarket-PerfectCompetition,Monopoly,MonopolisticCompetition and Oligopoly(mainfeatures).Supply-Supplyandlawofsupply,Roleofdemand&supplyinpricedeterminationand effectof changesin demandand supplyon prices.

**UNIT-4**

IndianEconomy-Natureandcharacteristics ofIndian economyasunderdeveloped, developingandmixed economy (brief and elementary introduction), Privatization - meaning, merits and demerits.GlobalizationofIndianeconomy–merits anddemerits.Banking- Conceptof aBank, Commercial Bank- functions,CentralBank- functions, Difference betweenCommercial & Central Bank.

## CourseOutcomes:

CO1 Tointroducetheconcept of Data Abstraction & Data Independence.
CO2 Todescribethefactors various Data base Models.
CO3 Toapplytheconcept of Relational query Languages.
CO4 To impart knowledge of Query Processing optimization with the help of Algorithms.
CO5 Toknowaboutthestorage strategies including Hashing.
CO6 Toinstructaboutthe Transaction Processing.
CO7 To explain the mechanism of Database Security & Authentication.
CO8 Gained knowledge about Object oriented and object relational databases.

Mapping of Paper No – HSMC-01

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | M |
| CO3 | S | M | S | S | S | S | S | M | S | S | S | S | S | M | S |
| CO4 | S | S | S | S | M | S | S | S | S | S | S | S | S | M | S |
| CO5 | M | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO7 | S | S | S | M | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

REFERENCES:


1. JainT.R.EconomicsforEngineers, VKPublication.
2. FundamentalsofEngineering EconomicsbyKumar,WileyIndiaPvt.Ltd.
3. ChopraP.N., PrincipleofEconomics, KalyaniPublishers.
4. DewettK.K., Moderneconomictheory, S.Chand.
5. H.L.Abuja.,Moderneconomictheory, S.Chand.
6. DuttRudar&SundhramK.P.M.,IndianEconomy.
7. MishraS.K.,ModernMicro Economics, PragatiPublications.
8. SinghJaswinder,ManagerialEconomics, dream tech press.
9. AText BookofEconomic TheoryStonier and Hague(Longman'sLandon).
10. MicroEconomicTheory–M.L.Jhingan (S.Chand).
11. MicroEconomicTheory-H.L.Ahuja (S.Chand).
12. ModernMicroEconomics:S.K.Mishra(PragatiPublications).
13. EconomicTheory-A.B.N.Kulkarni&A.B.Kalkundrikar(R.Chand&Co).

# DatabaseManagementSystemLab

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | LC-CSE-209 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | Database ManagementSystemLab | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 0 | 0 | 4 | 2 | |
| Branches(B.Tech.) | ComputerScienceandEngineering | | | | |
| Classwork | 25Marks | | | | |
| Exam | 25Marks | | | | |
| Total | 50Marks | | | | |
| DurationofExam | 03Hours | | | | |

**CourseObjectives:**

1. Keepabreastofcurrentdevelopmentstocontinuetheirownprofessionaldevelopment
2. ToengagethemselvesinlifelonglearningofDatabasemanagementsystemstheoriesandtechnologiesthis enables themtopursehigherstudies.
3. To interact professionally with colleagues or clients located abroad and the ability to overcomechallenges that arises from geographic distance, cultural differences, and multiple languages in thecontextof computing.
4. Develop team spirit, effective work habits, and professional attitude in written and oral forms,towardsthedevelopmentof databaseapplications.

**Contents:**

i. Creationofa database andwritingSQLqueriestoretrieveinformationfrom thedatabase.
ii. PerformingInsertion,Deletion,Modifying,Altering,UpdatingandViewingrecordsbasedonconditions.
iii. CreationofViews,Synonyms,Sequence,Indexes,Savepoint.
iv. CreatinganEmployeedatabasetosetvariousconstraints.
v. Creatingrelationshipbetweenthedatabases.
vi. StudyofPL/SQLblock.
vii. WriteaPL/SQL blocktosatisfy some conditionsbyacceptinginputfromtheuser.
viii. Write aPL/SQLblockthat handlesall typesofexceptions.
ix. CreationofProcedures.
x. Creationofdatabasetriggersandfunctions
xi. Miniproject(ApplicationDevelopmentusingOracle/MySQL)
    a) InventoryControlSystem

b) MaterialRequirementProcessing.
c) HospitalManagementSystem.
d) RailwayReservationSystem.
e) PersonalInformationSystem.
f) WebBasedUserIdentificationSystem.
g) TimeTableManagementSystem.
h) HotelManagement

## CourseOutcomes:

CO1 Tointroducetheconcept of Data Abstraction & Data Independence.
CO2 Todescribethefactors various Data base Models.
CO3 Toapplytheconcept of Relational query Languages.
CO4 To impart knowledge of Query Processing optimization with the help of Algorithms.
CO5 Toknowaboutthestorage strategies including Hashing.
CO6 Toinstructaboutthe Transaction Processing.
CO7 To explain the mechanism of Database Security & Authentication.
CO8 Gained a knowledge about Object oriented and object relational databases.

Mapping of Paper No. LC-CSE-209

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | M | M | S | S | S | S |
| CO2 | M | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | S | S | S | S | M | S | S | M | S | S | S | S | S | S | S |
| CO4 | S | S | S | S | M | S | S | S | S | S | S | S | S | S | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | M |
| CO7 | S | M | S | M | S | S | M | S | S | S | S | S | S | S | S |
| CO8 | S | S | S | M | S | S | M | S | S | S | S | S | S | S | S |

S=Strong M=Medium W=Weak

# ComputationalStatisticsLab

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | LC-CSE-255 | | | | |
| Category | LaboratoryCourse | | | | |
| Coursetitle | ComputationalStatisticsLab | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 0 | 0 | 3 | 1.5 | |
| Classwork | 25Marks | | | | |
| Exam | 25Marks | | | | |
| Total | 50Marks | | | | |
| DurationofExam | 03Hours | | | | |

- Firstly, give a basic insight of R/Mat Lab and its various libraries, R as a Data Importing Tool,Simulation and Hypothesis testing, Simulation, Model building, Evaluation and Deployment,Bayesian computation, Fitting a line with Bayesian techniques and more which requires as percontentof AppliedComputational Statistics.

- Secondly,Experiments/ProgramsinR/MatLabrelatedtothecoursecontentsofAppliedComputationalStatisticscanbedesigned anddeveloped by thesubjectfaculty.

# DataStructuresandAlgorithmsLabUsingC

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | LC-CSE-213 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | DataStructuresandAlgorithmsLabUsingC | | | | |
| SchemeandCredits | L | T | P | Credits | Semester-3 |
| | 0 | 0 | 4 | 2 | |
| Branches(B.Tech.) | ComputerScienceandEngineering | | | | |
| Classwork | 25Marks | | | | |
| Exam | 25Marks | | | | |
| Total | 50Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Objectivesofthecourse:**

1.Toimpartthebasicconceptsofdatastructuresandalgorithms.
2. Tounderstandconceptsaboutsearchingandsortingtechniques

Data Structures Lab List of practical exercises, to be implemented using object-oriented approachin C++ Language.

1. Writeamenudrivenprogramthatimplementsfollowingoperations(usingseparatefunctions)ona lineararray:
    - Insertanewelementatend aswell asatagivenposition
    - Deleteanelementfromagiven whosevalueisgivenorwhosepositionisgiven
    - Tofindthelocationof agiven element
    - Todisplaytheelementsofthelinear array
2. Write a menu driven program that maintains a linear linked list whose elements are storedinonascendingorderandimplementsthefollowingoperations(usingseparatefunctions):
    - Insertanewelement
    - Deleteanexistingelement
    - Searchanelement

- Displayalltheelements

3. Write a program to demonstrate the use of stack (implemented using linear array) inconvertingarithmeticexpressionfrom infixnotationtopostfixnotation.
4. Programtodemonstratethe useofstack(implementedusinglinearlinkedlists)inevaluatingarithmeticexpressioninpostfixnotation.
5. Programtodemonstrationtheimplementationofvariousoperationsonalinearqueuerepresentedusinga lineararray.
6. Programtodemonstrationtheimplementationofvariousoperationsonacircularqueuerepresentedusinga lineararray.
7. Program to demonstration the implementation of various operations on a queuerepresentedusinga linear linked list(linkedqueue).
8. Programtoillustratetheimplementationofdifferentoperationsonabinarysearchtree.
9. Programtoillustratethetraversalofgraphusingbreadth-firstsearch
10. Programtoillustratethetraversalofgraphusingdepth-firstsearch.
11. Programtosortanarrayofintegersinascendingorderusingbubblesort.
12. Programtosortanarrayofintegersinascendingorderusingselectionsort.
13. Programtosortanarrayofintegersinascendingorderusinginsertionsort.
14. Programtosortanarrayofintegersin ascendingorderusingradixsort.
15. Programtosortanarrayofintegersinascendingorderusingmergesort.
16. Programtosortanarrayofintegersinascendingorderusingquicksort.
17. Programtosortanarrayofintegersinascendingorderusingheapsort.
18. Programtosortanarrayofintegersinascendingorderusingshellsort.
19. Programtodemonstratetheuseoflinearsearchtosearchagivenelementinanarray.
20. Programtodemonstratetheuseofbinarysearchtosearchagivenelementinasortedarrayinascending order.

## CourseOutcomes:

CO1 Tointroducetheconcept of Choice of right Data Structure,Algorithms.
CO2 Todescribethefactors Linear Search and BinarySearch Techniques.
CO3 Toapplytheconcept Algorithmsandtheircomplexityanalysis.
CO4 To impart knowledge of Priority Queue;OperationsoneachtypesofQueues.
CO5 Toknowabouttheoperationstheiralgorithms andthecomplexity analysis.
CO6 Toinstructaboutthe Applications of Binary Trees.
CO7 To explain the mechanism SelectionSort,BubbleSort.
CO8 Gained a knowledge about traversal algorithms andcomplexityanalysis.

Mapping of Paper No – LC-CSE-213

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | M | S | S | S | S | S | S | S | S |
| CO2 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | S | S | S | M | S | S | S | S | S | M | S | S | S | M | S |
| CO4 | M | S | S | S | M | S | S | S | S | M | S | S | S | S | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO7 | S | S | S | S | S | S | S | S | S | S | M | S | S | S | S |
| CO8 | S | M | S | S | S | S | M | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

# PythonProgrammingLab

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | LC-CSE-215 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | PythonProgrammingLab | | | | |
| SchemeandCredits | L | T | P | Credits | Semester-3 |
| | 0 | 0 | 2 | 1 | |
| Branches(B.Tech.) | ComputerScienceandEngineering | | | | |
| Classwork | 25Marks | | | | |
| Exam | 25Marks | | | | |
| Total | 50Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Objectives**

- Towrite,test,anddebugsimplePythonprograms.
- ToimplementPythonprogramswithconditionalsandloops.
- UsefunctionsforstructuringPythonprograms.
- RepresentcompounddatausingPythonlists,tuples,anddictionaries.
- Readand writedatafrom/tofilesinPython.

**ListofPrograms**

1. ComputetheGCDoftwonumbers.
2. Findthesquarerootofanumber(Newton‘smethod)
3. Exponentiation(powerofanumber)
4. Findthemaximumofalistofnumbers
5. LinearsearchandBinarysearch
6. Selectionsort,Insertionsort
7. Mergesort
8. Firstnprimenumbers
9. Multiplymatrices
10. Programsthattakecommandlinearguments(wordcount)

11. Findthemostfrequentwordsinatextreadfrom afile
12. SimulateellipticalorbitsinPygame
13. SimulatebouncingballusingPygame

## CourseOutcomes:

CO1 Tointroducetheconcept of moderncomputersystems,installingPython; basic syntax.
CO2 Todescribeunderstandingerrormessages; Controlstatements:if-else, loops(for, while).
CO3 Toapplytheconcept ofString manipulations: subscript operator, indexing.
CO4 To impart knowledge of text files: reading/writing text.
CO5 Toknowaboutthereplacing, inserting, removing anelement.
CO6 Toinstructaboutthe Programstructureanddesign.
CO7 To explain the mechanism of definingclasses;designwithclasses.
CO8 Gained knowledge about polymorphism,operatoroverloading; abstract classes.

Mapping of Paper No – LC-CSE-215

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | M | S | S | S | S | S | S | S | S | M | S | S | S | M |
| CO3 | S | S | S | M | S | S | S | M | S | S | S | S | S | S | S |
| CO4 | M | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO5 | S | M | S | S | S | S | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO7 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | S | S | S | S | S | S | M | S | S | S | S | S | S | S | S |

S=Strong M=Medium W=Weak

# DiscreteMathematics

| | | | | | |
|---|---|---|---|---|---|
| Course code | PCC-CSE-202 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Course title | DiscreteMathematics | | | | |
| SchemeandCredits | L | T | P | Credits | Semester -4 |
| | 3 | 1 | | 4 | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Note**:Examinerwillsetninequestionsintotal.Questiononewillbecompulsory.Questiononewill have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks eachto be set by taking two questions from each unit. The students have to attempt five questions intotal,firstbeingcompulsoryandselectingonefromeachunit.

**Objectivesofthecourse:**

- Toimpartthebasicconceptsof Sets,Relation,FunctionandPropositionalLogic
- TounderstandBasic Counting Techniques and Recurrence Relation
- ToUnderstand Definitions and examples of Algebraic Structures with one Binary Operation.
- ToimplementGraphs and their properties, Degree, Connectivity.

**Unit-I**

**Sets,Relation,FunctionandPropositionalLogic:**OperationsandLawsofSets,CartesianProducts,Representationofrelations,BinaryRelation,EquivalenceRelation,PartialOrderingRelation, POSET, Hasse Diagram, Lattices and its types, Function, Bijective functions, Inverse andComposite Function, Finite and infinite Sets, Countable and Uncountable Sets, Cantor's

diagonalargumentandThePowerSettheorem,**S**chroeder-Bernsteintheorem,Propositions,Logicaloperations, Conditional Statements, Tautologies, Contradictions, Logical Equivalence, The use ofQuantifiers

**Unit-II**

**Basic Counting Techniques and Recurrence Relation:**Pigeon-hole principle, Permutation andCombination**,**theDivisionalgorithm:PrimeNumbers,TheGCD:EuclideanAlgorithm,TheFundamentalTheoremofArithmetic.,Linearrecurrencerelationwithconstantcoefficients,Homogenous Solutions, Particular Solutions, Total Solutions, Solving recurrence relation usinggeneratingfunctions

**Unit-III**

**Algebraic Structures:** Definitions and examples of Algebraic Structures with one Binary Operation:SemiGroups,Monoids,Groups;CongruenceRelationandQuotientStructures,PermutationGroups, Cyclic groups, Normal Subgroups, Definitions and examples of Algebraic Structures withtwoBinaryOperation:Rings,IntegralDomain,Fields;BooleanAlgebraandBooleanRing,IdentitiesofBooleanAlgebra,Duality,RepresentationofBooleanFunction,DisjunctiveandConjunctiveNormalForm

**Unit-IV**

**Graphs and Trees:** Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Bi-connectedcomponentandArticulationPoints,Isomorphism,MultigraphandWeightedgraph,Shortest path in Weighted graphs, Eulerian paths and circuits, Hamiltonian path and circuits, PlanarGraphs, Euler's formulae, Graph Colouring, Trees,Binary trees and its traversals, Trees Sorting,Spanningtree, Minimal Spanning tree

## CourseOutcomes:

CO1 Tounderstandtheconcept of PartialOrderingRelation, POSET, Lattices and its types.
CO2 Todescribethefactors Contradictions, Logical Equivalence, The use ofQuantifiers.
CO3 Toapplytheconcept of, Permutation andCombination**,**theDivisionalgorithm.
CO4 To impart knowledge of Homogenous Solutions, Particular Solutions, Total Solutions.
CO5 ToknowabouttheStructures with one Binary Operation.
CO6 Toinstructaboutthe BooleanFunction,DisjunctiveandConjunctiveNormalForm.
CO7 To explain the mechanism of Connectivity, Path, Cycle, Sub Graph.
CO8 Gained a knowledge about PlanarGraphs, Euler's formulae, Graph Colouring,

Mapping of Paper No – PCC-CSE-202

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | M | S | S | S | S | M | S | S | S |
| CO2 | S | M | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | S | S | S | S | S | S | S | M | S | S | S | S | S | S | S |
| CO4 | S | S | S | S | M | S | S | S | S | S | S | S | S | M | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | M |
| CO7 | M | S | S | S | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | S | S | S | M | S | S | S | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

**ReferenceBooks:**


1. KennethH.Rosen,DiscreteMathematicsanditsApplications,TataMcGraw–Hill
2. SatinderBalGupta:ATextBookofDiscreteMathematicsandStructures,UniversitySciencePress, Delhi.
3. C.L.LiuandD.P.Mohapatra,ElementsofDiscreteMathematicsAComputerOrientedApproach,TataMcGraw–Hill.
4. J.P.TremblayandR.Manohar,Discretemathematicalstructureswithapplicationstocomputer science,TMGEdition,TataMcgraw-Hill
5. DiscreteMathematics,SemyourLipschutzandMarcLipson,Schaum’soutline

# ComputerOrganization&Architecture

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | PCC-CSE-204 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | ComputerOrganization&Architecture | | | | |
| SchemeandCredits | L | T | P | Credits | Semester-IV |
| | 3 | 0 | 0 | 3 | |
| Branches(B.Tech.) | ComputerScienceandEngineering | | | | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Note**: Examiner will set nine questions in total. Question one will be compulsory. Question onewill have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks eachto be set by taking two questions from each unit. The students have to attempt five questions intotal,firstbeingcompulsoryandselectingonefromeachunit.

**Objectivesofthecourse:**

Toexposethestudentstothefollowing:

- HowComputerSystemswork&thebasicprinciples
- InstructionLevelArchitectureandInstructionExecution
- Thecurrentstateofartinmemorysystemdesign
- HowI/Odevicesareaccessed anditsprinciples.
- ToprovidetheknowledgeonInstructionLevelParallelism
- Toimpartthe knowledgeonmicroprogramming
- Conceptsofadvancedpipeliningtechniques.

**Unit1**

**Functionalblocksofacomputer:**CPU,memory,input-outputsubsystems,controlunit.Instruction set architecture of a CPU–registers, instruction execution cycle, RTL interpretation ofinstructions, addressing modes, instruction set. Case study – instruction sets of some

commonCPUs.

**Data representation:** signed number representation, fixed and floating point representations,character representation. Computer arithmetic – integer addition and subtraction, ripple carryadder, carry look-ahead adder, etc. multiplication – shift-and add, Booth multiplier, carry savemultiplier,etc.Divisionrestoringandnon-restoringtechniques, floatingpointarithmetic.

**Unit2**

Introductiontox86architecture.

**CPUcontrolunitdesign:**hardwiredandmicro-programmeddesignapproaches,Casestudy–designofa simplehypothetical CPU.

**Memorysystemdesign:**semiconductormemorytechnologies,memoryorganization.

**Peripheral devices and their characteristics:** Input-output subsystems, I/O device interface, I/Otransfers–programcontrolled,interruptdrivenandDMA,privilegedandnon-privilegedinstructions, software interrupts and exceptions. Programs and processes–role of interrupts inprocessstatetransitions,I/Odeviceinterfaces– SCII, USB

**Unit3**

**Pipelining:**Basicconceptsofpipelining,throughputandspeedup,pipelinehazards.

**Parallel Processors:** Introduction to parallel processors, Concurrent access to memory and cachecoherency.

**Unit4**

**Memory organization:** Memory interleaving, concept of hierarchical memory organization, cachememory,cachesizevs.blocksize, mappingfunctions,replacementalgorithms, writepolicies.

## CourseOutcomes:

CO1 Learned theconcept of RTL interpretation ofinstructions, addressing modes.
CO2 Knowthefactors of instruction set, Case study – instruction sets of some commonCPUs.
CO3 Toapplytheconcept ofmemorytechnologies,memoryorganization.
CO4 To impart knowledge of Programs and processes–role of interrupts inprocessstatetransitions.
CO5 Toknowaboutthespeedup,pipelinehazards.
CO6 Toinstructaboutthe Introduction to parallel processors.
CO7 To explain the mechanism of concept of hierarchical memory organization,.
CO8 Gained knowledge about hierarchical memory organization, cachememory.

Mapping of Paper No – PCC-CSE-204

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | M | S | S | S | S |
| CO2 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | S | S | S | M | S | S | S | S | S | S | S | S | S | M | S |
| CO4 | S | S | S | S | M | S | S | S | S | S | S | S | S | M | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | M |
| CO7 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | M | S | S | S | S | S | M | S | S | S | S | S | S | S | S |

S=Strong M=Medium W=Weak

**Suggestedbooks:**

1) "Computer SystemArchitecture",3rd EditionbyM.MorrisMano,Pearson.
2) ComputerSystemArchitectureandOrganization: byUsha,WileyIndiaLtd.
3) "Computer Organizationand Design:TheHardware/Software Interface",5thEdition byDavid A.Patterson andJohn L.Hennessy, Elsevier.
4) "ComputerOrganizationandEmbeddedSystems",6thEditionbyCarlHamacher,McGrawHill HigherEducation.

**Suggestedreferencebooks:**

1) "ComputerArchitectureandOrganization",3rdEditionbyJohnP.Hayes,WCB/McGraw-Hill
2) "ComputerOrganizationandArchitecture:DesigningforPerformance",10thEditionbyWilliamStallings, PearsonEducation.
3) "ComputerSystemDesignandArchitecture",2ndEditionbyVincentP.HeuringandHarry F.Jordan,PearsonEducation.

# OperatingSystem

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | PCC-CSE-206 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | PrinciplesofOperatingSystem | | | | |
| SchemeandCredits | L | T | P | Credits | Semester-4 |
| | 3 | 0 | 0 | 3 | |
| Branches(B.Tech.) | ComputerScienceandEngineering | | | | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Note**: Examiner will set nine questions in total. Question one will be compulsory. Question onewill have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks eachto be set by taking two questions from each unit. The students have to attempt five questions intotal,firstbeingcompulsoryandselectingonefromeachunit.

**Objectivesofthecourse:**

Toexposethestudentstothefollowing:

- HowComputerOperatingSystems,GenerationsofOperatingsystems works.
- Benefitsofthreads,Typesofthreads,Multithreading.
- ThecurrentstateofMutual Exclusion, The Producer\ConsumerProblem.
- HowBasicconcept,LogicalandPhysicaladdress map works.

**UNIT 1:**

**Introduction:**ConceptofOperatingSystems,GenerationsofOperatingsystems,TypesofOperatingSystems,OSServices,SystemCalls,StructureofanOS-Layered,Monolithic,MicrokernelOperatingSystems,ConceptofVirtual Machine.

**Processes:**Definition,ProcessRelationship,DifferentstatesofaProcess,ProcessStatetransitions, Process Control Block (PCB), Context switching. **Thread:** Definition, Various states,Benefitsofthreads,Typesofthreads,Multithreading.

**ProcessScheduling**:FoundationandSchedulingobjectives,TypesofSchedulers,Schedulingcriteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Schedulingalgorithms: Pre-emptiveandNon-pre-emptive,FCFS, SJF,SRTF,

RRScheduling.

**UNIT 2:**

**Inter-process Communication:**Critical Section, Race Conditions, Mutual Exclusion, The Producer\ConsumerProblem,Semaphores,EventCounters,Monitors,MessagePassing,ClassicalIPCProblems: Reader's&WriterProblem,DinningPhilosopherProblem etc.

**Deadlocks:**Definition,Necessaryandsufficientconditionsfor Deadlock, DeadlockPrevention,andDeadlockAvoidance:Banker's algorithm,Deadlockdetectionand Recovery.

**UNIT 3:**

**MemoryManagement:**Basicconcept,LogicalandPhysicaladdress map, Memoryallocation:ContiguousMemoryallocation–FixedandvariablepartitionInternalandExternalfragmentationandCompaction;Paging:Principleofoperation–Pageallocation–Hardwaresupportforpaging,Protectionandsharing,Disadvantagesofpaging.

**VirtualMemory**: Basics of Virtual Memory – Hardware and control structures –Locality of reference, Page fault, Working Set, Dirty page/Dirty bit–Demandpaging,PageReplacement algorithms: Optimal, First in First out (FIFO), Optimal Page Replacement and LeastRecentlyused(LRU).

**UNIT 4:**

**I/O Hardware:** I/O devices, Device controllers, Direct memory access Principles of I/O Software:Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-StorageStructure:Diskstructure,Diskschedulingalgorithms

**FileManagement**:ConceptofFile,Accessmethods,Filetypes,Fileoperation,Directorystructure, File System structure, Allocation methods (contiguous, linked, indexed), efficiency andperformance.

**Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability,Diskformatting,Boot-block,Badblocks.CasestudyonUNIXandWINDOWSOperatingSystem.

## CourseOutcomes:

CO1 Tointroducetheconcept of OperatingSystems,ConceptofVirtual Machine.
CO2 TodescribeSchedulingalgorithms: Pre-emptiveandNon-pre-emptive.
CO3 Toapplytheconcept ofEventCounters,Monitors,MessagePassing.
CO4 To impart knowledge of Locality of reference, Page fault.
CO5 ToknowabouttheMemoryallocation:ContiguousMemory.
CO6 Toinstructaboutthe Demandpaging,PageReplacement algorithms.
CO7 To explain the mechanism of I/O devices, Device controllers.
CO8 Gained knowledge about Fileoperation,Directorystructure.

Mapping of Paper No – PCC-CSE-206

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | S | S | S | S | S | S | S | M | S | S | S | S | S | M | S |
| CO4 | S | S | S | S | M | S | S | S | S | S | S | S | S | M | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO7 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

**Suggestedbooks:**

1. OperatingSystemConceptsEssentials,9thEditionbyAviSilberschatz,PeterGalvin,Greg Gagne,Wiley AsiaStudentEdition.
2. OperatingSystems:InternalsandDesignPrinciples,5thEdition,WilliamStallings,Prentice HallofIndia.

**Suggestedreferencebooks:**

1. OperatingSystem:ADesign-orientedApproach,1stEditionbyCharlesCrowley,IrwinPublishing
2. OperatingSystems: AModern Perspective,2nd EditionbyGaryJ.Nutt,Addison-Wesley
3. DesignoftheUnixOperatingSystems,8th EditionbyMauriceBach,Prentice-HallofIndia
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly andAssociates

# ObjectOrientedProgramming

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | PCC-CSE-208 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | ObjectOrientedProgramming | | | | |
| SchemeandCredits | L | T | P | Credits | Semester-4 |
| | 3 | 0 | 0 | 3 | |
| Branches(B.Tech.) | ComputerScienceandEngineering | | | | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Note**:Examinerwillsetninequestionsintotal.Questiononewillbecompulsory.Questiononewill have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks eachto be set by taking two questions from each unit. The students have to attempt five questions intotal,firstbeingcompulsoryandselectingonefromeachunit.

**Objectivesofthecourse:**

Toexposethestudentstothefollowing:

- HowObject-OrientedProgrammingConcepts works.
- Creating class objects, accessing class members.
- Concept of binding - early binding and late binding.

## Unit -I

**Object-OrientedProgrammingConcepts:**Introduction,comparisonbetweenproceduralprogrammingparadigmandobject-orientedprogrammingparadigm,basicconceptsofobject-oriented programming — concepts of an object and a class, interface and implementation of aclass, operations on objects, relationship among objects, abstraction, encapsulation, data hiding,inheritance,overloading,polymorphism,messaging.

**Classes and Objects:** Specifying a class, creating class objects, accessing class members, accessspecifiers, static members, use of const keyword, friends of a class, empty classes, nested classes,local classes, abstractclasses, containerclasses, bitfieldsand classes.

**Unit- II**

**Inheritance:** Introduction, defining derived classes, forms of inheritance, ambiguity in multiple andmultipathinheritance,virtualbaseclass,objectslicing,overridingmemberfunctions,objectcomposition anddelegation,orderofexecution of constructorsanddestructors.

**Pointers and Dynamic Memory Management:** Declaring and initializing pointers, accessing datathrough pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memorymanagement using new and delete operators, pointer to an object, this pointer, pointer relatedproblems-dangling/wildpointers,nullpointerassignment,memoryleakand allocationfailures.

**Unit- III**

**Constructors and Destructors:** Need for constructors and destructors, copy constructor, dynamicconstructors, explicit constructors, destructors, constructors and destructors with static members,initializerlists.

**OperatorOverloadingandTypeConversion:**Overloadingoperators,rulesforoverloadingoperators, overloading of various operators, type conversion - basic type to class type, class type tobasictype,class typeto anotherclass type.

**Virtual functions & Polymorphism**: Concept of binding - early binding and late binding, virtualfunctions,purevirtualfunctions,abstractclasses, virtual destructors.

**Unit -IV**

**Exception Handling:** Review of traditional error handling, basics of exception handling, exceptionhandlingmechanism,throwingmechanism,catchingmechanism,rethrowinganexception,specifyingexceptions.

**Templates and Generic Programming**: Template concepts, Function templates, class templates,illustrativeexamples.

## CourseOutcomes:

CO1 Tointroducetheconcept of interface and implementation of aclass.
CO2 Todescribethenested classes,local classes, abstractclasses.
CO3 Toapplytheconcept ofambiguity in multiple and multipathinheritance.
CO4 To impart knowledge of accessing datathrough pointers.
CO5 Toknowaboutthecopy constructor, dynamicconstructors.
CO6 Toinstructaboutthe basic type to class type, class type tobasictype.
CO7 To explain the mechanism of, basics of exception handling.
CO8 Gained a knowledge about Function templates, class templates.

Mapping of Paper No – PCC-CSE-206

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | S | S | S | S | S | S | S | M | S | S | S | S | S | M | S |
| CO4 | M | S | S | S | S | S | S | S | S | S | S | S | S | M | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO7 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | S | S | M | S | S | S | S | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

**TEXTBOOKS,AND/ORREFERENCEMATERIAL:**


1. BjraneStroustrup,“C++Programminglanguage”,3rdedition,PearsoneducationAsia(1997)
2. Object-OrientedProgramminginC++,byShukla,WileyIndiaLtd.
3. LaforeR.”ObjectorientedProgramminginC++”,4thEd.Techmedia,NewDelhi (2002).
4. YashwantKenetkar,”LetusC++”,1stEd.,OxfordUniversityPress(2006)
5. B.A.ForouzanandR.F.Gilberg,CompilerScience,”AstructuredapproachusingC++”CengageLearning,NewDelhi

# ORGANIZATIONALBEHAVIOUR

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | HSMC-02 | | | | |
| Category | | | | | |
| Coursetitle | ORGANIZATIONALBEHAVIOUR | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 2 | 0 | 0 | 2 | |
| Branches(B.Tech.) | | | | | |
| Classwork | 25 | | | | |
| Exam | 75 | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

The objective of this course is to expose the students to basic concepts of managementandprovideinsights necessary tounderstandbehavioral processes at individual, teamandorganizational level.

Note: Examiner will set nine questions in total. Question one will be compulsory. Questionone will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15markseach tobeset by takingtwoquestions from each unit. Thestudentshavetoattemptfivequestionsintotal,first beingcompulsoryandselectingonefromeachunit.

Objectivesofthecourse:

Toexposethestudentstothefollowing:

- Defining scope of management & Importance of management.
- Concept of Meaning and process of Organization.
- Concept of InterpersonalProcesses-TeamsandGroups.

## UNIT-1

**Introduction of Management**- Meaning, definitions, nature of management; Managerial levels,skillsandrolesinanorganization;FunctionsofManagement:Planning,Organizing,staffing, Directing&Controlling,Interrelationship ofmanagerial functions,scope of management & Importance of management. Difference between managementandadministration.

**UNIT-2**

**Introduction of organization:-**Meaning and process of Organization, Management v/sOrganization;**FundamentalsofOrganizationalBehavior:**Concepts,evolution,importance and relationship with other Fields; Contemporary challenges and opportunitiesofOB.**IndividualProcessesandBehavior-Personality**-Concept,determinantsandapplications; **Perception-** Concept, process and applications, **Learning**- Concept (BriefIntroduction); **Motivation-**Concept,techniquesand importance

**UNIT-3**

**InterpersonalProcesses-TeamsandGroups**-DefinitionofGroup,Stagesofgroup development, Types of groups, meaning of team, merits and demerits of team;difference between team and group, **Conflict-** Concept, sources, types, managementofconflict;**Leadership:**Concept,function,styles&qualitiesofleadership.

**Communication–**Meaning,process,channelsofcommunication,importanceand barriers ofcommunication.

**UNIT4**

**OrganizationalProcesses:Organizationalstructure**-Meaningandtypesoforganizational structure and their effect on human behavior; **Organizational culture** -Elements, types and factors affecting organizational culture. **Organizational change:**Concept, types&factorsaffectingorganizationalchange, ResistancetoChange.

## CourseOutcomes:

CO1 Tointroducetheconcept FunctionsofManagement:Planning,Organizing
CO2 Todescribeprocess of Organization, Management v/sOrganization.
CO3 ToapplytheconceptofIndividualProcessesandBehavior-Personality.
CO4 To impart knowledge of Motivation-Concept,techniquesand importance
CO5 ToknowabouttheDefinitionofGroup,Stagesofgroupdevelopment
CO6 ToinstructLeadership:Concept,function,styles&qualitiesofleadership.
CO7 To explain the Meaningandtypesoforganizational structure
CO8 Gained a knowledge about **:**Concept, types&factorsaffectingorganizationalchange

Mapping of Paper No – HSMC-02

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | M | S | S | S | M | S | S | S | M | S | S | S | S | M |
| CO3 | S | S | S | S | S | S | S | M | S | S | S | S | S | S | S |
| CO4 | S | S | S | S | S | S | S | S | S | S | S | S | S | M | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | M |
| CO7 | M | S | S | S | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | S | S | S | S | M | S | M | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

**SuggestedBooks:**


1. Robbins,S.P.andDecenzo,D.A.FundamentalsofManagement,PearsonEducationAsia,NewDelhi.
2. OrganizationalBehavior, 12ed,bySchermhorn,WileyIndia Ltd
3. Stoner,Jet.al,Management,NewDelhi,PHI,NewDelhi.
4. SatyaRaju,Management–Text&Cases,PHI,NewDelhi.
5. OrganizationalBehaviour:Design,StructureandCulture,2edbyGupta,WileyIndia Ltd.
6. KavitaSingh,OrganisationalBehaviour:Textand cases.NewDelhi:PearsonEducation.
7. Pareek,Udai,UnderstandingOrganisationalBehaviour,Oxford UniversityPress,NewDelhi.
8. Robbins,S.P.&Judge,T.A.,OrganisationalBehaviour,PrenticeHallofIndia,NewDelhi.
9. GhumanKarminder,AswathappaK.,Managementconceptpracticeandcases,McGrawHilleducation.
10. Chhabra T. N., Fundamental of Management, Sun India Publications-New Delhi.

# FundamentalsofDS, AI&ML

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | PCC-CSE-254 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | Fundamentals of DS, AI & ML | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 3 | 0 | 0 | 3 | |
| Classwork | 25Marks | | | | |
| Exam | 75Marks | | | | |
| Total | 100Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Note**: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6parts of 2.5 marks each from all units andremaining eight questions of 15 marks each to be set by takingtwo questions from eachunit. The students have to attempt five questions in total, first being compulsoryandselectingonefrom each unit.

## Learning&CourseOutcomes:

Oncompletionofthis course,the studentsareexpected to -

1. UnderstandtheverybasicsandUsesofArtificialIntelligence(AI)
2. Understandthebasics and usesofMachine Learning(ML)
3. Understandthe ApplicationofAIbydomain and itscurrent research trends.
4. UnderstandthesocietalimpactofAIML,explainableAIanddataanalytics

## UNIT– I

**Introduction to AI:** What is AI, Turing test, cognitive modeling approach, law of thoughts, the relationalagent approach, the underlying assumptions about intelligence, techniques required to solve AI problems,level of details required to model human intelligence, successfully building an intelligent problem, history ofAI

## UNIT– II

**Introduction to Machine Learning:** What is Machine Learning, Learning from Data, History of MachineLearning,BigDataforMachineLearning,LeveragingMachineLearning,DescriptivevsPredictiveAnalytics,Machine Learning and Statistics, Artificial Intelligence and Machine Learning, Types of MachineLearning–Supervised,Unsupervised,Semi-supervised,ReinforcementLearning,TypesofMachineLearningAlgorithms,ClassificationvsRegressionProblem,Bayesian,Clustering,DecisionTree,

DimensionalityReduction, Neural NetworkandDeepLearning, Trainingmachine learningsystems

## UNIT– III

**AI Research Trends:** Research trends in machine learning, deep learning, reinforcement learning, robotics,computer vision, natural language processing, collaborative systems, algorithmic game theory, internet ofthings(Io T), neuromorphic computing

**Applications of AI by domain:** Transportation, home/service robots, healthcare, education, low- resourcecommunities, public safety and security, employment and workplace, entertainment, finance, banking andinsurance

## UNIT– IV

**Role of Artificial Intelligence in Society:** Societal challenges AI presents, Ethical and Societal implications,policyand law forAI, fosteringdialogue, sharingof bestpractices

**Malicious Use of AI: Prevention and Mitigation:** Security relevant properties of AI, Security domains andscenarios: digital security, physical security, political security, factors affecting the equilibrium of AI andsecurity

**Explainable AI:** Introduction to explainable AI, why explainable AI, interpretability and explain ability,methodsof interpretabilityandexplain ability

**Introduction to Data Analytics:** Working with Formula and Functions, Introduction to Charts, LogicalfunctionsusingExcel, Analyzing Data with Excel.

## ReferenceBooks:


1. ArtificialIntelligence3e:AModernApproachPaperback–ByStuartJRussell&PeterNorvig;Publisher– Pearson
2. Artificial IntelligenceThirdEditionByKevinKnight,ElaineRich,B.Nair–McGraw Hill
3. ArtificialIntelligenceThirdEditionByPatrickHenryWinston–Addison-WesleyPublishingCompany
4. Machine LearningusingPytho,UDineshKumar, Manaranjan Pradhan,JohnWiley&Sons.
5. AClassical ApproachtoArtificialIntelligence,M.C.Trivedi,KhannaPublishingHouse.
6. MachineLearning,V.K.Jain,KhannaPublishingHouse.
7. Advanced DataAnalytics UsingPython:With Machine Learning, Deep Learning, SayanMukhopadhyay,Apress.
8. MachineLearningforAbsoluteBeginners:APlainEnglishIntroduction,2nd ed.,OliverTheobal
9. BigData andAnalytics, S.Acharya,S. Chellappan,WileyPublication.
10. IntroductiontoMachine Learning,JeevaJose,KhannaPublishingHouse.

# OperatingSystemLab

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | LC-CSE-212 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | OperatingSystemLab | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 0 | 0 | 4 | 2 | |
| Branches(B.Tech.) | ComputerScienceandEngineering | | | | |
| Classwork | 25Marks | | | | |
| Exam | 25Marks | | | | |
| Total | 50Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Objectivesofthecourse:**

Toexposethestudentstothefollowing:

- HowComputerOperatingSystems,GenerationsofOperatingsystems works.
- Benefitsofthreads,Typesofthreads,Multithreading.

**Contents:**

1. 1IntroductiontoUNIXFileSystem.
2. FileandDirectoryRelatedCommandsinUNIX.
3. EssentialUNIXCommandsforworkinginUNIX environment.
4. I/ORedirectionand Piping
5. IntroductiontoVIEditors.
6. IntroductionofProcessesinUNIX
7. Communicationin UNIXandAWK.
8. IntroductionoftheconceptofShellScripting.
9. DecisionandIterativeStatementsinShellScripting.
10. WritingtheShallScriptsforunknownproblems.

## CourseOutcomes:

CO1 Tointroducetheconcept of OperatingSystems,ConceptofVirtual Machine.
CO2 TodescribeSchedulingalgorithms: Pre-emptiveandNon-pre-emptive.
CO3 Toapplytheconcept ofEventCounters,Monitors,MessagePassing.
CO4 To impart knowledge of Locality of reference, Page fault.
CO5 ToknowabouttheMemoryallocation:ContiguousMemory.
CO6 Toinstructaboutthe Demandpaging,PageReplacement algorithms.
CO7 To explain the mechanism of I/O devices, Device controllers.
CO8 Gained knowledge about Fileoperation,Directorystructure.

Mapping of Paper No – LC-CSE-212

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | S | S | S | S | S | S | S | M | S | S | S | S | S | M | S |
| CO4 | S | S | S | S | M | S | S | S | S | S | S | S | S | M | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO7 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

**SuggestedBooks:**

1. UNIXShellProgrammingbyYashavantKanetkar.
2. UNIXConceptsandApplicationsbySumitabhaDas

# ObjectOrientedProgrammingLabUsingC++

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | LC-CSE-214 | | | | |
| Category | ProfessionalCoreCourse | | | | |
| Coursetitle | ObjectOrientedProgrammingLabUsingC++ | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 0 | 0 | 4 | 2 | |
| Branches(B.Tech.) | ComputerScienceandEngineering | | | | |
| Classwork | 25Marks | | | | |
| Exam | 25Marks | | | | |
| Total | 50Marks | | | | |
| DurationofExam | 03Hours | | | | |

**Objectivesofthecourse:**

Toexposethestudentstothefollowing:

- HowObject-OrientedProgrammingConcepts works.
- Concept of binding - early binding and late binding.

**Contents:**

1. [ClassesandObjects]Writeaprogramthatusesaclasswherethememberfunctionsaredefinedinsideaclass.
2. [ClassesandObjects]Writeaprogramthatusesaclasswherethememberfunctionsaredefinedoutside aclass.
3. [ClassesandObjects]Writea program to demonstratethe useofstaticdatamembers.
4. [ClassesandObjects]Writeaprogram to demonstratethe useofconst datamembers.
5. [ConstructorsandDestructors]Writeaprogramtodemonstratetheuseofzeroargumentandparameterizedconstructors.
6. [ConstructorsandDestructors]Writeaprogramtodemonstratetheuseofdynamicconstructor.
7. [ConstructorsandDestructors]Writeaprogramtodemonstrate theuseofexplicitconstructor.
8. [InitializerLists]Write aprogramto demonstrate theuse ofinitializerlist.
9. [OperatorOverloading]Writeaprogramtodemonstratetheoverloadingofincrementanddecrementoperators.
10. [OperatorOverloading]Writeaprogramtodemonstratetheoverloadingofbinaryarithmeticoperators.
11. [OperatorOverloading]Writeaprogramtodemonstratetheoverloadingofmemorymanagementoperators.
12. [Inheritance]Writeaprogramto demonstratethemultilevelinheritance.
13. [Inheritance]Writeaprogram todemonstratethemultipleinheritance.

14. [Inheritance]Writeaprogram to demonstratethevirtual derivationofaclass.
15. [Polymorphism]Writeaprogramtodemonstratetheruntimepolymorphism.
16. [ExceptionHandling]Writeaprogramtodemonstratetheexceptionhandling.
17. [TemplatesandGenericProgramming]Writeaprogramtodemonstratetheuseoffunctiontemplate.
18. [TemplatesandGenericProgramming]Writeaprogramto demonstratetheuseofclasstemplate.

## CourseOutcomes:

CO1 Tointroducetheconcept of interface and implementation of aclass.
CO2 Todescribethenested classes,local classes, abstractclasses.
CO3 Toapplytheconcept ofambiguity in multiple andmultipathinheritance.
CO4 To impart knowledge of accessing datathrough pointers.
CO5 Toknowaboutthecopy constructor, dynamicconstructors.
CO6 Toinstructaboutthe basic type to class type, class type tobasictype.
CO7 To explain the mechanism of , basics of exception handling.
CO8 Gained knowledge about Function templates, class templates.

Mapping of Paper No – LC-CSE-214

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | S | S | S | S | S | S | S | M | S | S | S | S | S | M | S |
| CO4 | S | S | S | S | M | S | S | S | S | S | S | S | S | M | S |
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO7 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

# Programming forDataScience&AILAB

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | LC-CSE-258 | | | | |
| Category | LaboratoryCourse | | | | |
| Coursetitle | Programming for Data Science & AI Lab | | | | |
| SchemeandCredits | L | T | P | Credits | |
| | 0 | 0 | 2 | 1 | |
| Classwork | 25Marks | | | | |
| Exam | 25Marks | | | | |
| Total | 50Marks | | | | |
| DurationofExam | 03Hours | | | | |

## TentativeListofExperiments:

1. Pythonprogramtodisplaydetailsabouttheoperatingsystem,workingdirectory,files

   Anddirectoriesinthe currentdirectory, listsdthefilesandalldirectories, scanandclassifythemasdirectoriesandfiles
2. Pythonprogram toconvert anarraytoanarrayofmachinevaluesand viceversa
3. Pythonprogramtogetinformationaboutthefilepertainingtothe filemode andtogettimevalueswithcomponents usinglocal timeandgmtime.
4. PythonprogramtoconnecttoGoogleusingsocketprogramming
5. Pythonprogram toperform Arrayoperations usingNumpypackage
6. PythonprogramtoperformDataManipulationoperationsusingPandaspackage.
7. Pythonprogramtodisplaymultipletypesofchartsusing Matplotlibpackage
8. PythonprogramtoperformFileOperationonExcelDataSet
9. PythonprogramtoimplementwithPythonSciKit-Learn&NLTK.
10. PythonprogramtoimplementwithPythonNLTK/Spicy/PyNLPI.

**NOTE:MoreprogramsrelatedtothecoursecontentsofObjectProgrammingforDataScience&AIML can bedesignedand developed by the subjectfaculty.**

**ENVIRONMENTALSCIENCE**
**MC-106**

| L | T | P | Credits | ClassWork:25Marks |
|---|---|---|---|---|
| 2 | 0 | 1 | - | Theory:75Marks |
| | | | | DurationofExam:3Hrs. |

Theory75 Marks FieldWork25Marks(Practical/Fieldvisit)

**Objectivesofthecourse:**

- Toimparttheknowledge of environmentstudies.
- TounderstandBasic Renewableandnon-renewableresources.
- ToUnderstand Definitions Ecosystems: Producers,consumersanddecomposers.
- Toknow aboutHuman population and the Environment

**Unit-1**TheMultidisciplinarynatureofenvironmentstudies.Definition,scopeandimportance.

**Unit-2NaturalResources:**

Renewableandnon-renewableresources:Natural resourcesandassociatedproblems.

a) Forestresources: Useandover-exploitation: deforestation,casestudies.Timberextraction,mining dams andtheireffects on forestsandtribal people.

b) Waterresources: Useandover-utilizationofsurfaceandgroundwater,floods,drought,conflicts overwater, dams-benefits andproblems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and usingmineralresources, casestudies.

d) Foodresources: Worldfoodproblems,changes,causedbyagricultureandovergrazing,effectsofmodernagriculture,fertilizer-pesticideproblems,Waterlogging,salinity, casestudies.

e) Energy resources: Growing energy needs; renewable and non-renewable energysources,use of alternateenergysources, casestudies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soilerosionand desertification.

* Roleofanindividualinconservationofnaturalresources.

* Equitableuseofresources forsustainablelifestyles.

**Unit-3**Ecosystems:

* Producers,consumersanddecomposers.
* Energyflow in theecosystem.
* Ecologicalsuccession.
* Foodchains,foodwebsandecologicalpyramids.
* Introduction, types, characteristic features, structure and function of the followingeco-system:

a. Forestecosystem.
b. Grasslandecosystem.
c. Desertecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers,oceans,estuaries) (6lectures)

**Unit-4**Biodiversityand itsconservation

* Introduction-Definition: Genetic,Species andecosystemdiversity.
* Valueofbiodiversity:consumptiveuse,productiveuse,social,ethical,aestheticandoption values.
* Biodiversityatglobal,National andlocallevels.
* India asamega-diversitynation.
* Hot-spotsofbiodiversity.
* Threatstobiodiversity:habitatloss,poachingof wildlife,man-wildlifeconflicts.
* EndangeredandendemicspeciesofIndia.
* Conservation ofbiodiversity:In-situandex-situconservationofbiodiversity.

**Unit-5**Environmental pollution:

Definition,causes,effectsandcontrolmeasuresof :

a) Airpollution.
b) Waterpollution
c) Soilpollution
d) Marinepollution
e) Noisepollution

f) Thermalpollution

g) Nuclearhazards

* Solids waste management: causes, effects and control measures of urban andindustrialwastes.
* Roleofanindividual inprevention ofpollution.
* Pollutioncasestudies.
* Disastermanagement: floods,earthquake,cycloneandlandslides.

(8lectures)

**Unit-6**Socialissuesand theEnvironment:

* Fromunsustainableto sustainabledevelopment.
* Urbanproblemsrelatedtoenergy.
* Waterconservation,rain waterharvesting,watershedmanagement.
* Resettlementandrehabilitationof people: itsproblemsandconcernscasestudies.
* Environmentalethics:Issuesandpossiblesolutions.
* Climatechange,globalwarming,acidrain,ozonelayerdepletion,nuclearaccidentsandholocaust.Casestudies.
* Wastelandreclamation.
* Consumerismandwaste products.
* EnvironmentProtectionAct.
* Air(PreventionandControl ofpollution)Act.
* Water(PreventionandControl ofpollution)Act.
* WildlifeProtectionAct.
* ForestConservationAct.
* Issuesinvolvedinenforcementofenvironmentallegislation.
* Publicawareness. (7lectures)

**Unit-7**Human population and the Environment.Population growth, variation among nations.Population explosion- Family Welfare Programme.Environmentand humanhealth.

HumanRights.

ValueEducation.

HIV/AIDS.

WomanandChildWelfare

Role of Information Technology in Environment and human health.CaseStudies. (6 lectures)

**Unit-8**FieldWork:

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visittoalocalpollutedsite-urban/Rural/Industrial/Agricultural.
* Studyof commonplants,insects, birds.

Studyofsimpleecosystems-pond,river, hillslopes,etc. (Fieldworkequalto10 lecturehours)

## CourseOutcomes:

CO1 Tointroducetheconcepts of Multidisciplinarynatureofenvironmentstudies.
CO2 TodescribetheRoleofanindividualinconservationofnaturalresources.
CO3 Toapplytheconcept ofFoodchains,foodwebsandecologicalpyramids.
CO4 To impart knowledge and control measures of urban andindustrialwastes.
CO5 ToknowabouttheSocialissuesand theEnvironment.
CO6 ToinstructIssuesinvolvedinenforcementofenvironmentallegislation.
CO7 To explain In-situandex-situconservationofbiodiversity.
CO8 Gained knowledge about ozonelayerdepletion,nuclearaccidentsandholocaust.

Mapping of Paper No – MC-106

| Course Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO3 | S | S | S | S | S | S | S | M | S | S | S | S | S | M | S |
| CO4 | S | S | S | S | M | S | S | S | S | S | S | S | S | M | S |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO5 | S | S | S | S | S | M | S | S | M | S | S | S | S | S | S |
| CO6 | S | S | S | S | S | M | S | S | S | S | S | S | S | S | M |
| CO7 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |
| CO8 | S | S | S | S | S | S | M | S | S | S | M | S | S | S | S |

S=Strong M=Medium W=Weak

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Thescheme of thepaper will beunder :

The subject of Environmental Studies will be included as a qualifying paper in all UG Coursesand the students will be required to qualify the same otherwisethe final result will not bedeclaredand degreewill not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with thesemesterexaminations.

Exam.Pattern: Incaseofawardingthemarks,thepaper willcarry100marks.Theory:75marks,Practical/Field visit : 25marks.
Thestructureof thequestionpaper will be :

Part-A:ShortAnswer Pattern :15marks

Part- B: Essay Type with inbuilt choice:60marks

Part-C:FieldWork(Practical) :25marksInstructionsforExaminers :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3markseach covering theentire syllabus.

Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and thecandidate will be required to answer any four of them. Each essay type question will be of 15marks.

The examination of the regular students will be conducted by the concerned college/Institute. Eachstudent will be required to score minimum 40% marks separately in theory and practical/Field visit.The marks in this qualifying paper will not be included in determining the percentage of marksobtained forthe awardofdegree.

However,thesemarkswillbeshowninthedetailedmarkscertificateofthestudents.

## DesignThinking Lab

| | | | | | |
|---|---|---|---|---|---|
| Coursecode | HS-150 | | | | |
| Category | HumanitiesandSocialSciencesCourse | | | | |
| Coursetitle | DesignThinkingLab | | | | |
| SchemeandCredits | L | T | P | Credits | Semester4 |
| | 0 | 0 | 2 | 1 | |
| InternalAssessment | 25Marks | | | | |
| Exam | 25Marks | | | | |
| Total | 50Marks | | | | |
| Duration of Exam | 03Hours | | | | |

## COURSEOBJECTIVE(S):

The objective of this Course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.

## COURSECONTENTS:

### Unit1:AnInsighttoLearning

UnderstandingtheLearningProcess,Kolb'sLearningStyles,AssessingandInterpreting

### Unit2:RememberingMemory

UnderstandingtheMemoryprocess,Problemsinretention,Memoryenhancementtechniques

### Unit3:Emotions:Experience&Expression

UnderstandingEmotions:Experience&Expression,AssessingEmpathy,ApplicationwithPeers

### Unit4:BasicsofDesignThinking

Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) –Empathize, Define, Ideate, Prototype, Test

### Unit5:Being Ingenious&FixingProblem

Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem Solving

## Unit6:ProcessofProductDesign

Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design

## Unit7:Prototyping&Testing

What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, Sample Example, Test Group Marketing

## Unit8:CelebratingtheDifference

Understanding Individualdifferences &Uniqueness, GroupDiscussionand Activitiestoencourage the understanding, acceptance and appreciation of Individual differences

## Unit9:DesignThinking& CustomerCentricity

Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with ProductDesign

## Unit10:Feedback,Re-Design&Re-Create

Feedback loop, Focus on User Experience, Address "ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation – "Solving Practical Engineering Problem through Innovative Product Design & Creative Solution".

## Course Outcomes(CO):

Studentwillableto:

1. CompareandclassifythevariouslearningstylesandmemorytechniquesandApply themin their engineering education
2. Analyze emotional experience and Inspect emotional expressions to better understand userswhile designing innovative products
3. DevelopnewwaysofcreativethinkingandLearntheinnovationcycleofDesignThinking process for developing innovative products
4. Proposereal-timeinnovativeengineeringproductdesignsandChooseappropriateframeworks, strategies, techniques during prototype development
5. Perceiveindividualdifferencesanditsimpactoneverydaydecisionsandfurther Createabetter customer experience